Test

- Matrix operations +/−/•
- Solving systems by hand
  - Gaussian Elimination w/ matrices
  - Substitution + elimination
  - dependent / inconsistent
    - same line: $7=7$, $0=0$
    - parallel: $7=0$, $9=11$
- Investment/acid type problems (see sect. 7.2 #601-5)
- Fit equation to data (ex. 8 in 7.3)
- On Calc
  - set up and solve matrix equations
  - decode messages

7.3 #77

$y = \frac{1}{2}x^2 - 2x$

$(0,0)\ (2,-2)\ (4,0)$ $\quad y = ax^2 + bx + c$

$0 = a(0)^2 + b(0) + c \longrightarrow c = 0$

$-2 = a(2)^2 + b(2) + c$

$0 = a(4)^2 + b(4) + c$

$4a + 2b + c = -2$

$16a + 4b + c = 0$

$16\left(\frac{1}{2}\right) + 4b = 0$

$8 + 4b = 0$

$b = -2$

$4a + 2b = -2 \quad (-2)$

$16a + 4b = 0$

$-8a - 4b = 4$

$16a + 4b = 0$

$8a = 4$

$a = \frac{1}{2}$

7.3 #80

$(1,3)\ (2,2)\ (3,-3)$

$3 = a(1)^2 + b(1) + c$

$2 = a(2)^2 + b(2) + c$

$-3 = a(3)^2 + b(3) + c$

$\longrightarrow$

$a + b + c = 3$

$4a + 2b + c = 2$

$9a + 3b + c = -3$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 4 & 2 & 1 & 2 \\ 9 & 3 & 1 & -3 \end{array}\right] \Rightarrow \left[\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 0 & -2 & -3 & -10 \\ 9 & 3 & 1 & -3 \end{array}\right]$$

$-4, -4, -4, -12$; $-9, -9, -9, -27$; (-9) ; $-4R_1 + R_2$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 0 & -2 & -3 & -10 \\ 0 & -6 & -8 & -30 \end{array}\right] \xrightarrow{-9R_1 + R_2} \left[\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 0 & 1 & \frac{3}{2} & 5 \\ 0 & -6 & -8 & -30 \end{array}\right]$$

$R_2 \div -2$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 3 \\ 0 & 1 & 3/2 & 5 \\ 0 & 0 & 1 & 0 \end{array}\right] \Rightarrow$$

$a + b + c = 3$

$b + \frac{3}{2}c = 5$

$c = 0$

$a = -2$

$b = 5$

$c = 0$

$y = -2x^2 + 5x$

#63 7.2

amount of $x \to 40\%$ amount of $y \to 65\%$

$$x + y = 20$$

$$0.4x + 0.65y = 0.5 \cdot 20$$

strength amount s an s an

$$= \begin{matrix} x+y=20 \quad (-0.4) \\ 0.4x+0.65y=10 \end{matrix}$$

$$\begin{matrix} -0.4x - 0.4y = -8 \\ 0.4x + 0.65y = 10 \end{matrix}$$

$$0.25y = 2$$

$$\boxed{y = 8}$$

$$\boxed{x = 12}$$

#65

$15,000 | 7.5% | 6% | $990 return

x | y

$x + y = 15{,}000 \quad (-0.075)$

$0.075x + 0.06y = 990$

$-0.075x - 0.075y = -1125$

$0.075x + 0.06y = 990$

$-0.015y = -135$

$y = \$9000$

$x = \$6000$

$$\begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix} + \begin{bmatrix} 1 & 5 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 3 & 8 \\ 6 & 4 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 1 \\ 4 & 2 & 1 \\ 9 & 3 & 1 \end{bmatrix} \cdot \begin{bmatrix} a \\ 3 \\ c \end{bmatrix} = \begin{bmatrix} 3 \\ -2 \\ -3 \end{bmatrix}$$

$$[A] \cdot [X] = [B]$$

$$[X] = [A]^{-1} \cdot [B] \qquad [X] = \begin{bmatrix} -2 \\ 5 \\ 0 \end{bmatrix}$$

$$A = \begin{bmatrix} 1 & -2 & 2 \\ -1 & 1 & 3 \\ 1 & -1 & -4 \end{bmatrix}$$

$$\begin{bmatrix} 13 & -26 & 21 \\ -24 & 23 & 77 \end{bmatrix} \begin{bmatrix} 33 & -53 & -12 \\ 18 & -23 & -42 \\ 5 & -20 & 56 \end{bmatrix}$$

$$[B] \cdot [A]^{-1}$$

$$\begin{bmatrix} 13 & -26 & 21 \\ 33 & -53 & -12 \\ 18 & -23 & -42 \\ 5 & -20 & 56 \\ -24 & 23 & 77 \end{bmatrix} \cdot [A]^{-1}$$

(B)

HW p. 548 # 2, 17, 26 + 27 (just solve), 34, 49, 50, 61,

74, 77, 103, 104, 135, 169